

Earth Sciences Final Exam Study Guide 2017

1. Scientific Method
 - a. Constructing a Hypothesis
 - b. Designing an experiment to test a Hypothesis
 - c. Accuracy vs. Precision
 - d. Data collection, recording, interpretation and presentation
 - e. Conclusion and future work
 - f. Scientific Bias
2. Lab Safety
3. Scientific Law vs. Theory
4. Creation of the Universe
 - a. Big Bang Theory
 - b. Nebular Hypothesis
 - c. Creation of our Solar System
 - d. Formation of gas giants and dwarf planets
 - e. Formation of rocky planets
 - f. Asteroids and comets
 - g. Mercury vs. Venus
 - h. Formation/ early Earth
 - i. Planetary differentiation
 - i. Solid Inner core
 - ii. Molten Outer core
 - iii. Molten Mantle
 1. Density
 2. Convection cells
 - iv. Crust - composition
5. Origin of Elements
 - a. Small Stars - light elements
 - b. Super Nova - heavy elements
6. States of Matter
 - a. Solid
 - b. Liquid
 - c. Gas
 - d. Plasma
7. Periodic table of Elements
 - a. Structure and properties of the atom and elements in the periodic table
 - i. Protons, Neutrons, Electrons
 - b. Atomic number vs atomic mass number

- c. Atomic Bonding
- d. Why atoms bond?
- e. How does bonding affects chemical properties of an element or mineral?
- f. Types of Bonding
 - i. Covalent
 - ii. Ionic
 - iii. Metallic
- 8. Continental Drift
- 9. Plate tectonics
 - a. Sea-floor spreading
 - i. Divergent plate boundary oceanic-oceanic e.g. Mid-Atlantic Ridge
 - ii. Divergent plate boundary continental- continental e.g. African Rift Valley
 - iii. Convergent plate boundary continental oceanic e.g. South America - Nazca Plates
 - iv. Convergent plate boundary continental continental e.g. Indian - Eurasian Plate
 - v. Transform plate boundary e.g. San Andreas
- 10. Volcanos
 - a. Basic structure of a volcano
 - b. Types of volcanoes
 - i. Shield
 - ii. Cindercone
 - iii. Stratovolcanoes
 - iv. Fissure
 - v. Hot spot
 - c. Other features
 - i. Hot springs
 - ii. Geysers
 - iii. Fumerals
 - d. Uses of volcanos
 - i. Hydrothermal energy
 - ii. Industry
 - iii. Construction
 - iv. Eco-tourism
 - v. Diamonds
- 11. Faults (Brittle deformation)
 - a. Anatomy of a fault
 - b. Normal

- i. Tension
 - ii. Hanging wall moved down
- c. Reverse
 - i. Compressional
 - ii. Hanging wall moves up
- d. Strike-Slip

12. Earthquakes

- i. Causes of Earthquakes
 - 1. Elastic Rebound Theory
- ii. Where Earthquakes occur
- iii. Epicenter vs. focus
 - 1. Identifying the location of Earthquake
 - 2. Triangulation
- iv. S waves, P waves and Love waves
- v. Seismograph
- vi. How earthquakes taught us about the structure of the inside of Earth.

13. Folding (Ductile deformation)

- a. Anatomy of a fold
 - i. Anticline
 - ii. Syncline
- b. Recumbent
- c. Overturn

14. Stratigraphy

- a. Laws
 - i. Original Horizontality
 - ii. Superposition
 - iii. Cross cutting
 - iv. Included fragments
- b. Keybeds
- c. Outcrops
- d. Unconformities
 - i. Disconformity (Sedimentary rock layers separated by an erosional surface)
 - ii. Nonconformity (Sedimentary rock - metamorphic/ igneous rocks)
 - iii. Angular unconformity (rock layers tilted then new sediments deposited horizontally on top of them.)

15. Relative dating

- a. Matching rock layers

- b. Correlation
- 16. Absolute dating
 - a. Half life
 - b. Parent daughter isotopes
 - c. Alpha Decay
 - i. Uranium 238
 - ii. Thorium 230
 - d. Beta Decay
 - i. Radiocarbon (C-14)
 - ii. Nitrogen
- 17. Uniformitarianism - present key to the past
- 18. Minerals
 - a. Identification
 - i. Crystal structure
 - ii. Streak
 - iii. Cleavage
 - iv. Luster
 - v. Transparency
 - vi. Etc
 - b. Crystal structure
- 19. Rock cycle
 - a. Igneous
 - i. Extrusive
 - ii. Intrusive
 - b. Sedimentary
 - i. Bioclastic
 - ii. Clastic
 - iii. Solution
 - c. Metamorphic
 - i. Foliated
 - ii. Non foliated
 - iii. Contact
 - iv. Regional
- 20. Water cycle
 - a. Evaporation
 - b. Condensation
 - c. Precipitation
 - d. Infiltration
 - e. Runoff

- f. Transpiration
 - g. Porosity
 - h. Permeability
21. Weathering (breaking down of rock)
- a. Chemical
 - i. Dissolution
 - ii. Evaporation
 - iii. Precipitation
 - iv. Oxidation
 - v. Reduction
 - b. Physical
 - i. Wind (abrasion)
 - ii. Water - Ice wedging
 - c. Biological
 - i. Plants
 - ii. Animals including man
22. Erosion (transportation of rock)
- a. Wind
 - b. Water
 - i. Liquid (Rivers and Oceans)
 - ii. Frozen (Ice-sheets)
 - c. Gravity
23. Fossils
- a. Trace fossils
 - i. Trails/ tracks
 - ii. Burrows
 - iii. Coprolites
 - b. Body fossils
 - i. Petrified wood
 - ii. Insects in Amber
 - iii. Original body parts
 - iv. Molds
 - v. Casts
 - vi. Carbon films
24. Geological timescale
- a. Major events in Earth History
 - i. Quaternary - Evolution of Humans
 - ii. Tertiary - Mammals Diversify
 - iii. Cretaceous - Extinction of Dinosaurs and Mammal radiation

- iv. Jurassic - First birds - Dinosaurs diversify
- v. Triassic - First mammals and dinosaurs
- vi. Permian - Largest mass extinction
 - 1. Details on the Permian mass extinction
 - 2. Siberian traps - temperature
 - 3. Methane in the permafrost
 - 4. Hydrogen sulfide and the Ozone layer
- vii. Carboniferous - Reptiles, Large trees, Seed- based reproduction, Ferns - ice ages
- viii. Devonian - Amphibians. Diversification of fishes
- ix. Silurian - Vascular land plants (phloem and xylem)
- x. Ordovician - Mass extinction - Gondwana drifted south
- xi. Cambrian - Diverse life in the oceans. Primitive fish and Pika - notochord

25. The Atmosphere

- a. Layers of the atmosphere
- b. Properties/ role of each layer
- c. Greenhouse effect
- d. Global Warming (Carbon dioxide, methane)
- e. Chlorofluorocarbons
- f. The ozone layer

26. Oceanography

- a. Origin of the oceans
- b. Salinity
- c. Coriolis Force
- d. Waves
- e. Surface currents
- f. Density currents
 - i. Thermohaline circulation
 - ii. North Atlantic Deep Water
 - iii. Antarctic Bottom Water
 - iv. Mediterranean Intermediate Water
- g. Tides

27. Upwelling

- a. Nutrient cycling/ surfacing
- b. El Niño
- c. La Niña

28. Climate

- a. Climate change

- b. Natural vs. manmade climate change
- c. Contributions of the developed vs. developing world
- d. Who should pay to fix the problem?